UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/643,628	08/18/2003	Wei Li	50277-2250	4451

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ART UNIT	PAPER NUMBER
2166	

DATE MAILED: 03/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	10/643,628	LI ET AL.
	Examiner	Art Unit	
	Usmaan Saeed	2166	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 August 2003*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 August 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 10/5/04, 10/8/04, ~~12/31/04~~, 12/02/04,

4)☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

1.   Claims 1-26 are pending in this office action.

Information Disclosure Statement

2.   Applicants' Information Disclosure Statements, filed on 10/05/2004, 10/08/2004,

10/22/2004, 12/02/2004, 1/03/2005, 8/17/2005, 10/17/2005 and 1/27/2006 have been

received, entered and considered. See attached form PTO-1449.

Specification

3.   The disclosure is objected to because of the following informalities:

The specification is missing the summary of the invention. The summary of the

invention needs to be included to overcome this objection.

Content of Specification

(g)   <u>Brief Summary of the Invention</u>: See MPEP § 608.01(d). A brief summary
       or general statement of the invention as set forth in 37 CFR 1.73. The
       summary is separate and distinct from the abstract and is directed toward
       the invention rather than the disclosure as a whole. The summary may
       point out the advantages of the invention or how it solves problems
       previously existent in the prior art (and preferably indicated in the
       Background of the Invention). In chemical cases it should point out in
       general terms the utility of the invention. If possible, the nature and gist of
       the invention or the inventive concept should be set forth. Objects of the

invention should be treated briefly and only to the extent that they contribute to an understanding of the invention.

Claim Rejections - 35 USC § 101

4.   Claims 14-26 are rejected under 35 U.S.C. 101 as being directed to non-statutory subject matter. The language of the claims raises a question as to whether the claims are directed merely to an abstract idea that us not tied to technological art, environment or machine which would result in a practical application producing a concrete useful, and tangible result to form the basis of statutory subject matter under 35 U.S.C. 101.

Claims 14-26 are rejected because the "computer readable medium" is not limited to tangible media in accordance with Applicant's specification which states that it may be a "Transmission media can also take the form of acoustic or light waves, such as those generated during radio-wave and infra-red data communications" not in and itself a tangible medium. However these claims may be amended to limit the claimed invention to computer readable storage medium.

To expedite a complete examination of the instant application the claims rejected under U.S.C. 101 (nonstatutory) above are further rejected as set forth below in anticipation of application amending these claims to place them within the four categories of invention.

Claim Rejections - 35 USC § 102

5.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-26 are rejected under 35 U.S.C. 102(b) as being anticipated by

Agrawal et al. (Agrawal hereinafter) (U.S. Patent No. 6,324,533).

With respect to claim 1, **Agrawal** teaches **a method for performing a frequent**

itemset operation, the method comprising the steps of:

"within a database server that supports a particular database language,

parsing a database statement to detect within the database statement a construct

that extends the particular database language" as an object of the present invention

is to provide a method for mining data relationships from the integrated mining system

in the form of queries to SQL engines, and with k-way join, three-way join, subqueries,

and group-by operations for counting the itemset support (**Agrawal** Col 2, Lines 27-31).

A method for mining data relationships from the integrated mining system in the form of

queries to SQL engines enhanced with object-relational extensions (SQL-OR), such as

user-defined functions (UDFs) and table functions (**Agrawal** Col 2, Lines 33-36).

Examiner interprets the table functions as construct.

"**in response to detection of said construct, the database server performing a frequent itemset operation as part of execution of the database statement**" as the mining operation is expressed in some extension of SQL or a graphical language, which are input to preprocessor 21. This preprocessor generates appropriate SQL translations for the mining operation. For example, these SQL translations may be those that are executed by a SQL-92 relational engine 22. It is assumed that blobs, user-defined functions, and table functions are available in the object-relational engine. The mining results might be output to a depository 24 (**Agrawal** Col 6, Lines 26-42).

With respect to claim 2, **Agrawal** teaches "**the method of claim 1 wherein the particular database language is SQL**" as a method for mining data relationships from the integrated mining system in the form of queries to SQL engines enhanced with object-relational extensions (SQL-OR), such as user-defined functions (UDFs) and table functions (**Agrawal** Col 2, Lines 33-36).

With respect to claim 3, **Agrawal** teaches "**the method of claim 1 wherein the construct is a table function**" as a method for mining data relationships from the integrated mining system in the form of queries to SQL engines enhanced with object-relational extensions (SQL-OR), such as user-defined functions (UDFs) and table functions (**Agrawal** Col 2, Lines 33-36). Examiner interpreted the table functions as construct.

With respect to claim 4, **Agrawal** teaches **the method of claim 1 wherein:**

"the database statement includes a first indication of a first input format"

as the data table is first transformed into a vertical format by creating for each item a

BLOB containing all tids that contain that item (Tid-list creation phase) and then count

the support of itemsets by merging together these tid-lists (support counting phase)

(Agrawal Col 12, Lines 43-47).

"the frequent itemset operation operates on input that conforms to said

first input format" as a table function Gather is used for creating the Tid-lists. This is

the same as the Gather function in GatherJoin except here, the tid-list is created for

each frequent item. The data table T is scanned in the (item, tid) order and passed to

the function Gather. The function collects the tids of all tuples of T with the same item in

memory and outputs a (item, tid-list) tuple for items that meet the minimum support

criterion. The tid-lists are represented as BLOBs and stored in a new TidTable with

attributes (item, tid-list) **(Agrawal** Col 12, Lines 48-56).

"the method further comprises the steps of: parsing a second database

statement to detect within the second database statement the construct that

extends a database language" as a method for mining data in an integrated database

and data-mining system. Start with step 30, a group-by query is performed on the data

transactions to generate a set of frequent 1-itemsets. One-itemsets are those having

exactly one item each, while an itemset is frequent if the number of transactions

containing it is at least at a specified number. At step 31, frequent 2-itemsets are

determined from the frequent 1-itemsets and the transaction table. A candidate set of

(n+2)-itemsets is next generated in step 32 from the frequent (n+1)-itemsets, where

n=1. At step 33, frequent (n+2)-itemsets are generated from the candidate set of (n+2)-

itemsets and the transaction table using a query (**Agrawal** Col 6, Lines 43-55). A first

query is being performed to generate 1-itemsets, and (n+2) itemsets are being

generated using another query. **"wherein the second database statement includes a**

second indication of a second input format that is different from said first input

format" as a horizontal format where each tid is followed by a collection of all its items

(**Agrawal** Col 10, Lines 37-38).

"in response to detection of said construct in said second database

statement, the database server performing a second frequent itemset operation

as part of execution of the second database statement" as the mining operation is

expressed in some extension of SQL or a graphical language, which are input to

preprocessor 21. This preprocessor generates appropriate SQL translations for the

mining operation. For example, these SQL translations may be those that are executed

by a SQL-92 relational engine 22. It is assumed that blobs, user-defined functions, and

table functions are available in the object-relational engine. The mining results might be

output to a depository 24 (**Agrawal** Col 6, Lines 26-42). **"wherein the second frequent**

itemset operation operates on input that conforms to said second format" as K-

way Join approach where the k-way self join of T is replaced with the table functions

Gather and Comb-K. It is possible to merge these functions together as a single table

function GatherComb-K. The Gather function is not required when the data is already in

a horizontal format where each tid is followed by a collection of all its items (**Agrawal**

Col 10, Lines 33-38).

With respect to claim 5, **Agrawal** teaches **"the method of claim 4 wherein the**

first indication is identification of a first table function" as a table function Gather is

used for creating the Tid-lists. This is the same as the Gather function in GatherJoin

except here, the tid-list is created for each frequent item. The data table T is scanned in

the (item, tid) order and passed to the function Gather. The function collects the tids of

all tuples of T with the same item in memory and outputs a (item, tid-list) tuple for items

that meet the minimum support criterion (**Agrawal** Col 12, Lines 48-56). **"and the**

second indication is identification of a second table function" as the output of

Gather is passed to another table function Comb-K which returns all k-item

combinations formed out of the items of a transaction (**Agrawal** Col 10, Lines 24-27).

With respect to claim 6, **Agrawal** teaches **"the method of claim 1 wherein the**

frequent itemset operation uses, as input, a row source that is generated during

execution of other operations specified in said database statement" as output is a

collection of rules of varying length. The maximum length of these rules is much

smaller than the number of items and is rarely more than a dozen. Therefore, a rule is

represented as a tuple in a fixed-width table where the extra column values are set to

NULL to accommodate rules involving smaller itemsets. The schema of a rule is

(item.sub.1, . . ., item.sub.k, len, rulem, confidence, support) where k is the size of the

largest frequent itemset (**Agrawal** Col 5, Lines 65-67 & Col 6, Lines 1-6). A table

function, GenRules, is used to generate all possible rules from a frequent itemset. The

input to the function is a frequent itemset. For each itemset, it outputs tuples

corresponding to rules with all non-empty proper subsets of the itemset in the

consequent. The table function outputs tuples with k+3 attributes, T_item.sub.1, . . . ,

T_item.sub.k, T_support, T_ten, T_rulem (**Agrawal** Col 8, Lines 7-13). From first

operation a row/tuple is being obtained, which is then being used as an input.

With respect to claim 7, **Agrawal** teaches **"the method of claim 1 wherein the**

frequent itemset operation produces, as output, a row source that is used as

input for other operations specified in said database statement" as output is a

collection of rules of varying length. The maximum length of these rules is much

smaller than the number of items and is rarely more than a dozen. Therefore, a rule is

represented as a tuple in a fixed-width table where the extra column values are set to

NULL to accommodate rules involving smaller itemsets. The schema of a rule is

(item.sub.1, . . . , item.sub.k, len, rulem, confidence, support) where k is the size of the

largest frequent itemset (**Agrawal** Col 5, Lines 65-67 & Col 6, Lines 1-6). A table

function, GenRules, is used to generate all possible rules from a frequent itemset. The

input to the function is a frequent itemset. For each itemset, it outputs tuples

corresponding to rules with all non-empty proper subsets of the itemset in the

consequent. The table function outputs tuples with k+3 attributes, T_item.sub.1, . . . ,

T_item.sub.k, T_support, T_ten, T_rulem (**Agrawal** Col 8, Lines 7-13). From first

operation a row/tuple is being obtained as an output, which is then being used as an

input.

With respect to claim 8, **Agrawal** teaches **"the method of claim 1 wherein: the**

database statement specifies a frequency threshold; and the step of performing

the frequent itemset operation includes performing the frequent itemset operation

based on the frequency threshold specified in the database statement" as the

group-by query preferably includes the steps of counting the number of transactions that

contain each item and selecting the items that have a support above a user-specified

threshold in determining the frequent 1-itemsets. The support of an item is the number

of transactions that contain the item. In determining the frequent 2-itemsets, each 1-

itemset is joined with itself and two copies of the transaction table using join predicates.

The joining results for a pair of items are grouped together in counting the support of the

items in the pair. All 2-itemsets that have a support below a specified threshold are

removed from the set of 2-itemsets, resulting in the frequent 2-itemsets (**Agrawal** Col 2,

Lines 53-64).

With respect to claim 9, **Agrawal** teaches **"the method of claim 1 wherein: the**

database statement specifies a minimum length; and the step of performing the

frequent itemset operation includes performing a frequent itemset operation

whose results exclude all item sets that include fewer items than the minimum

length specified in the database statement" as combinations of items whose support

is greater than minimum support. Call those combinations frequent itemsets (**Agrawal**

Col 5, Lines 21-23). The function collects the tids of all tuples of T with the same item in

memory and outputs a (item, tid-list) tuple for items that meet the minimum support

criterion (**Agrawal** Col 12, Lines 52-55).

With respect to claim 10, **Agrawal** teaches "**the method of claim 1 wherein:**

the database statement specifies a maximum length; and the step of performing

the frequent itemset operation includes performing a frequent itemset operation

whose results exclude all item sets that include more items than the maximum

length specified in the database statement" as F consists of k+2 attributes

(item.sub.1, . . . , item.sub.k, support, len), where k is the size of the largest frequent

itemset and len is the length of the itemset (**Agrawal** Col 8, Lines 4-6).

With respect to claim 11, **Agrawal** teaches "**the method of claim 1 wherein:**

the database statement specifies a set of one or more included items; and the

step of performing the frequent itemset operation includes performing a frequent

itemset operation whose results exclude all itemsets that do not include all items

in said set of one or more included items" as the frequent (n+2)-itemsets are

determined using cascaded subqueries by: a) selecting distinct first items in the

candidate itemsets using a subquery. In generating rules from the union of the frequent

itemsets, all items from the frequent itemsets are first put into a table F. These

candidate rules are joined with the table F, and filtered to remove those that do not meet

a confidence criteria (**Agrawal** Col 3, Lines 2-16).

With respect to claim 12, **Agrawal** teaches "**the method of claim 1 wherein the**

step of performing the frequent itemset operation includes performing a frequent

itemset operation whose results identify frequent itemsets, and for each of the

frequent itemsets, a count of how many item groups included the frequent

itemset" as a set of frequent 1-itemsets is generated using a group-by query on data

transactions. From these frequent 1-itemsets and the transactions, frequent 2-itemsets

are determined. A candidate set of (n+2)-itemsets are generated from the frequent 2-

itemsets, where n=1. Frequent (n+2)-itemsets are determined from candidate set and

the transaction table using a query operation (**Agrawal** Abstract).

With respect to claim 13, **Agrawal** teaches "**the method of claim 1 wherein the**

step of performing the frequent itemset operation includes performing a frequent

itemset operation whose results identify frequent itemsets, and for each of the

frequent itemsets, a count of how items are in the frequent itemset" as a set of

frequent 1-itemsets is generated using a group-by query on data transactions (**Agrawal**

Abstract). The support counting phase, conceptually for each itemset in C.sub.k the tid-

lists of all k items are collected and the number of tids in the intersection of these k lists

is counted using a user defined function (UDF) (**Agrawal** Col 12, Lines 56-59).

Group of claims 14-26 is essentially the same as group of claims 1-13 except

they set forth the claimed invention as a computer readable media carrying instructions,

and are rejected for the same reasons as applied hereinabove.

Conclusion

6.   The prior art made of record and not replied upon is considered pertinent to

applicant's disclosure is listed on 892 form.

Contact Information

7.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Usmaan Saeed whose telephone number is (571)272-

4046. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Hosain Alam can be reached on (571)272-3978. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Usmaan Saeed
Patent Examiner
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US
March 1, 2006

HOSAIN ALAM
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